

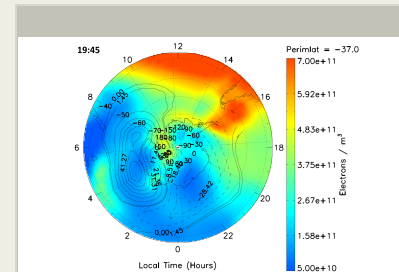
Developing Near Real-time Data-Assimilative Models and Tools for the Space Environment, Phase I

Completed Technology Project (2014 - 2014)



Project Introduction

The IDA4D and AMIE data assimilation methods are currently of limited use for real-time space weather applications because either they don't run in real-time (IDA4D) or the real-time version (AMIE) does not ingest the full complement of data needed to provide high fidelity outputs. To correct this situation, in Phase-I, we propose to demonstrate the feasibility of augmenting these algorithms so that they run in real-time, with the full complement of available data for ingestion. In Phase-I we will establish detailed system performance requirements and conceptual designs that will drive the development efforts to be performed in Phase-II. This will include constraints such as the size and resource expectations for the codes, as well as the necessary interfaces and resources for the collection and storage of data sets to be used in the assimilation, and how to respond to missing or corrupted data. An assessment of costs to build a real-time assimilative modeling capability using IDA4D and AMIE, and the cost to maintain and upgrade in the future will also be provided. The research conducted in phase-i will show a clear path towards a phase II prototype demonstration. In future Phase-II work, ASTRA will implement the augmentation of the existing IDA4D and AMIE algorithms to real-time operations, based on the conceptual designs and requirements established in Phase-I. Each requirement will be associated with a method of verification to be implemented in Phase II. The resulting data assimilative algorithms will be transferred to NASA, where they will be transformative for space weather operations. This innovation will enable the development of near real-time data-assimilative models and tools, for both solar quiet and active times, which allow for precise specification and forecasts of the space environment, beginning with solar eruptions and propagation, and including ionospheric electron density specification.



Developing Near Real-time Data-assimilative Models and Tools for the Space Environment Project Image

Table of Contents

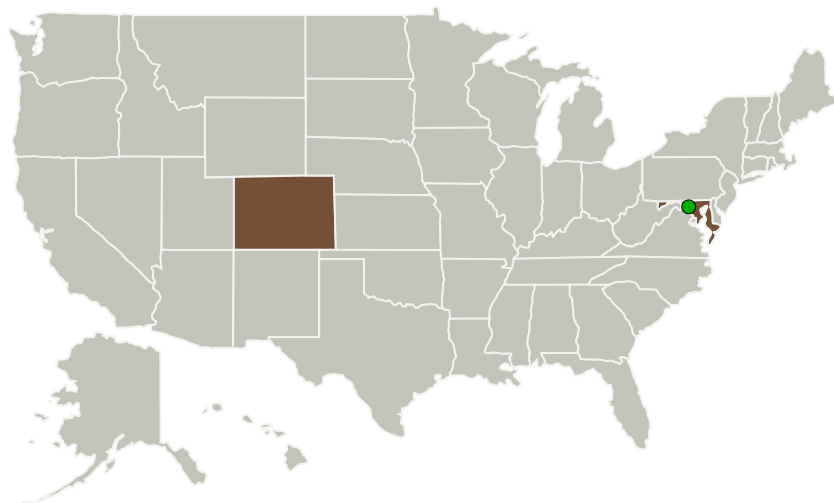
Project Introduction	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Images	3
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

Developing Near Real-time Data-Assimilative Models and Tools for the Space Environment, Phase I

Completed Technology Project (2014 - 2014)



Primary U.S. Work Locations and Key Partners



Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Atmospheric & Space Technology Research Associates, LLC (ASTRA)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Geoffrey Crowley

Organizations Performing Work	Role	Type	Location
Atmospheric & Space Technology Research Associates, LLC(ASTRA)	Lead Organization	Industry	Louisville, Colorado
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Colorado

Maryland

Project Transitions

▶ **June 2014:** Project Start

✓ **December 2014:** Closed out

Closeout Documentation:

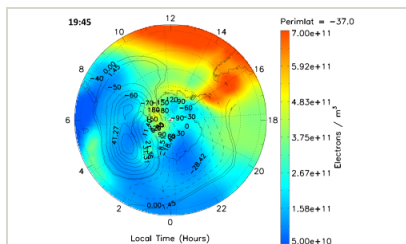
- Final Summary Chart(<https://techport.nasa.gov/file/137789>)

Developing Near Real-time Data-Assimilative Models and Tools for the Space Environment, Phase I

Completed Technology Project (2014 - 2014)



Images



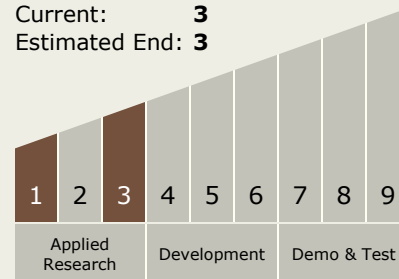
Project Image

Developing Near Real-time Data-assimilative Models and Tools for the Space Environment Project Image

(<https://techport.nasa.gov/image/129909>)

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - TX11.2 Modeling
 - TX11.2.4 Science Modeling

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System